

REMARKS

Please reconsider the present application in view of the above amendments and the following remarks. Applicant thanks the Examiner for acknowledging the claim for foreign priority and for indicating that claims 2 and 3 contain allowable subject matter.

At the outset, Applicant respectfully requests that the PTO Form-1449 from the IDS filed on June 6, 2003 be initialed and returned. Applicant notes that this IDS contains a typographical error in that a “Taiwanese” Office Action erroneously labeled as a “Japanese” Office Action.

Further, Applicant respectfully requests that the initialed PTO 1449 Forms from the Information Disclosure Statements filed on May 10, 2002, June 6, 2002, February 6, 2003, April 11, 2003, June 6, 2003, July 15, 2003, and January 23, 2004, be returned. If these Information Disclosure Statements have not been considered, appropriate consideration thereof is respectfully requested. Additionally, Applicant respectfully requests that the fee paid with the IDS filed on November 19, 2004, be refunded, as the IDS was filed before the mailing of a first Office Action after the filing of a request for continued examination. *See* MPEP § 609(a)(4).

Disposition of Claims

Claims 1-11 were pending in the present application. Of these claims, claims 7-11 are withdrawn from consideration. Further, new claims 12-16 have been added to the present application. Claims 1, 7, and 12 are independent. The remaining claims depend, directly or indirectly, from claims 1, 7, and 12.

Claim Amendments

Independent claim 1 has been amended by way of this reply. No new matter has been added by way of these amendments, as support for these amendments may be found, for

example, in Figure 3 of the present application and in paragraph [0027] of the present application. Further, claims 2-4 have been amended to correct various informalities. No new matter has been added by way of these amendments.

New Claims

New claims 12-16 have been added to the present application. Claim 2, indicated by the Examiner as containing allowable subject matter, has been rewritten in independent form as claim 12. Accordingly, dependent claims 13-16 have been added to the present application to contain limitations similar to claims 3-6. No new matter has been added by way of these amendments. Accordingly, entry and allowance of new claims 12-16 is respectfully requested.

Rejection(s) under 35 U.S.C § 103

Claims 1 and 4-6 were rejected under 35 U.S.C. § 103(a) as being obvious over European Patent Application Publication No. EP 0961328 issued to Motoki (hereinafter “Motoki”). Independent claim 1 has been amended in this reply to clarify the present invention recited. To the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed.

The present invention is directed to a method for manufacturing a nitride semiconductor device. The nitride crystals are hexagonal in shape, resulting in a six-fold rotational symmetry. Thus, any two lines forming a 120-degree angle are equivalent in view of the crystal structure. Accordingly, cuts made along directions forming 120-degree angles allow a wafer to be easily cut. In one embodiment of the present invention, the nitride crystals are formed on a sapphire substrate (*see* Specification, Figure 1, paragraphs [0021]-[0022]).

As seen with respect to an exemplary embodiment of the present invention shown in Figures 3a and 3b of the Specification, a number of layers are formed and etched on the substrate

(10). For example, an InGaN light-emitting layer (16) is formed on an n-GaN layer (14). A p-GaN layer (18) is then formed on the InGaN layer (16). The chip is then etched such that part of the n-GaN layer (12) is exposed, and an n-electrode (22) is formed on the n-GaN layer (12). Further, a p-electrode (20) and a transparent electrode (24) are formed on the p-GaN layer (18).

Accordingly, amended independent claim 1 requires forming a light-emitting section on a central section of the nitride semiconductor chip and forming an electrode at opposing ends of a planar surface the nitride semiconductor chip.

By selecting to cut a wafer along a direction which is easy to cut, the substrate does not need to be ground to a smaller thickness, which would normally be necessary to facilitate cutting. This reduces the time and precision necessary to cut a wafer. Further, as the p-electrode (20) and the n-electrode (22) are placed along a length direction on a planar surface of the semiconductor chip, a larger light-emitting area can be placed between the electrodes. This results in greater light extraction efficiency (*see* Specification, paragraph [0023]).

In contrast to the present invention, Motoki does not teach or suggest the present invention as recited in independent claim 1 of the present application. Further, Motoki teaches away from the present invention by discouraging the use of a sapphire substrate.

Motoki clearly states that for the purposes of the device of Motoki, a device consisting of sapphire and GaN has serious drawbacks. Motoki first states that a GaN/sapphire device has a large number of crystal defects (*see* Motoki, col. 1, lines 35-38). Motoki states that a device having a smaller number of defects than a GaN/sapphire device has a higher efficiency and a longer lifetime (*see* Motoki, col. 1, lines 51-54). Motoki states that another drawback of the sapphire substrate is its lack of cleavage planes, which result in a greater difficulty of cutting a wafer into individual chips (*see* Motoki, col. 1, line 55 – col. 2, line 15). Motoki concludes by

stating, "There is no way to overcome these difficulties as long as sapphire is used as a substrate material. The use of sapphire should be abandoned." (*see* Motoki, col. 2, lines 28-31).

Further, as seen with respect to Figure 6 of Motoki, a p-electrode (21) is formed on top of a transparent electrode (20), which is formed on a p-GaN layer (17). An n-electrode (22) is formed on the rear surface of the GaN substrate (12) (*see* Motoki, col. 11, lines 10-15). As seen with respect to Figure 8 of Motoki, the p-electrode (21) is formed on top of the transparent electrode (20). This is in stark contrast to the present invention, where both a p-electrode (20) and an n-electrode (22) are formed on a planar surface of the semiconductor device and enclose a transparent electrode (24), as discussed above.

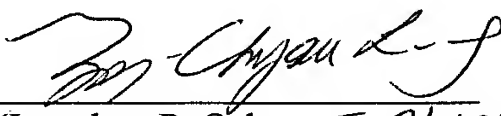
In view of the above, Motoki fails to show or suggest the present invention as recited in amended independent claim 1. Further, one skilled in the art would not be motivated by Motoki, which strongly discourages the use of a sapphire substrate, to arrive at the present invention. Thus, amended independent claim 1 is patentable over Motoki. Dependent claims are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places the present application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 08228/019001).

Dated: May 2, 2005

Respectfully submitted,

By 
for Jonathan P. Osha T. Chyan Liang
Registration No.: 33,986 #48,883
Osha • Liang LLP
1221 McKinney, Suite 2800
Houston, Texas 77010
(713) 228-8600
(713) 228-8778 (Fax)